

Trend Study 16C-32-04

Study site name: Muddy Creek.

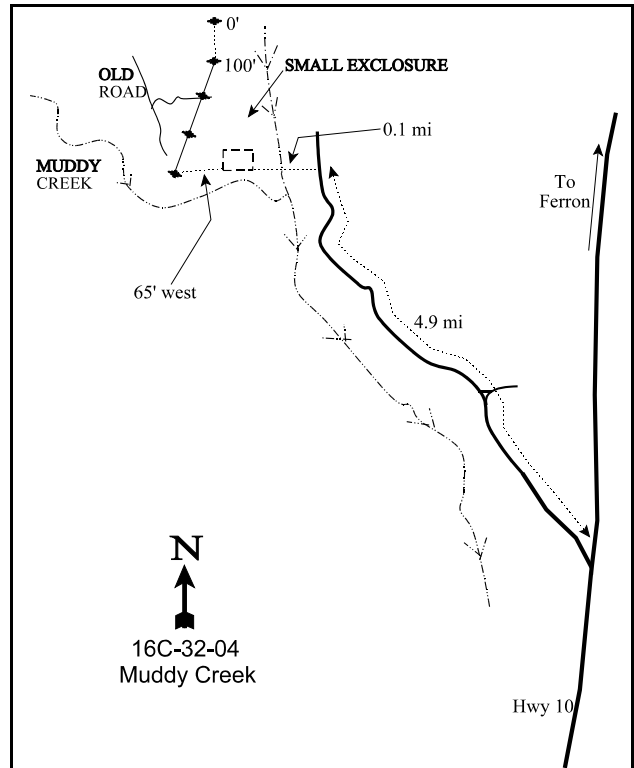
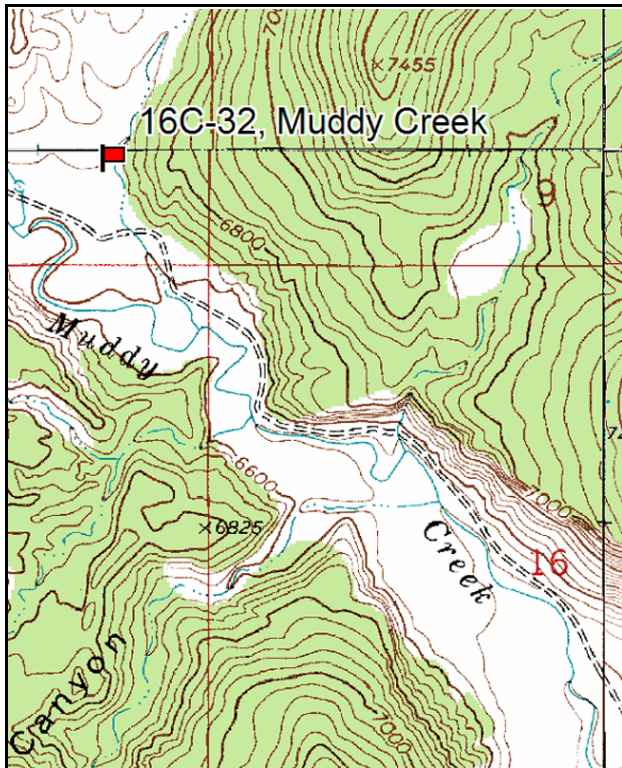
Vegetation type: Mountain Big Sagebrush.

Compass bearing: frequency baseline 162 degrees magnetic-line 1; 168 degrees magnetic-lines 2-4.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Belt 2 rebar @ 1'.

LOCATION DESCRIPTION

From Ferron, proceed south on Highway U-10 for 12 miles to the turnoff to Muddy Creek, which is just across from the southern Moore Road. Turn right and go 4.9 miles. Once you reach Muddy Creek, take a left across the creek for 0.1 miles to the site. From the small fenced enclosure, the 400-foot baseline stake is 65 feet west of the SW corner of the enclosure. The baseline start 400 feet north of this stake, and the 18 inch green fencepost marking the 0-foot end of the baseline has a red browse tag, #9029, attached.



Map Name: Emery West

Diagrammatic Sketch

Township 21S, Range 6E, Section 17

GPS: NAD 27, UTM 12S 4316546 N, 477156 E

DISCUSSION

Muddy Creek - Trend Study No. 16C-32

This trend study samples a unique area within the Muddy Creek drainage. A small flat (approximately 30 acres) in the bottom of the canyon supports a stand of Wyoming big sagebrush mixed with more typical desert shrubs. Large basin big sagebrush grow in the riparian areas, while pinyon-juniper woodland and mountain mahogany dominate the surrounding slopes. The study site is adjacent to a small Forest Service exclosure. Terrain is nearly level and drainage is to the southwest into Muddy Creek. Elevation is 6,600 feet. The flat is heavily used by deer and elk and to a lesser extent, trespass cattle from private land below the Forest Service fence. Pellet group data from 1999 estimate 12 deer and 70 elk days use/acre (30 ddu/ha and 173 edu/acre). Pellet group data from 2004 estimated 19 deer, 73 elk, and 6 cow days use/acre (46 ddu/ha, 180 edu/ha, and 14 cdu/ha). Cow pats encountered were from last season. Most of the elk and deer pellet groups were from winter and spring, although a few were more recent.

Soil is dense and moderately shallow with an effective rooting depth estimated at just over 10 inches. Texture is a sandy clay loam with a slightly alkaline pH (7.6). Phosphorus is limited at 5.9 ppm. Values less than 10 ppm can limit normal plant growth and development. Soil temperature is high at 72.2°F at an average depth of almost 10 inches. Percent organic matter was the lowest of all sites within this management unit (0.7%). Rock and pavement are rare on the surface or within the profile. Stoniness index measurements did not hit rock but instead, a compacted hard pan which varies in depth and is sometimes exposed on the surface because of eroded soils. Beyond the hardpan, soil would be considered deep on this alluvial plain. Numerous gullies flow from the flat into the deeply cut washes. Even with the level terrain, there is obvious erosion, pedestaled plants, and large bare areas. Much of the soil on the site has eroded away. Pedestaling between plants varied from 2 to 8 inches in height.

Wyoming big sagebrush is the key browse species in this area. The population has continued to decline since 1998 which was estimated at 7,532 plants/acre, 3,120 in 1994, 3,200 in 1999, and 400 in 2004. This sagebrush stand is decadent and old, vigor is poor, and utilization is heavy. Mortality rates continue to increase while very little young recruitment is coming back into the population. In 2004, no young or seedlings were sampled while approximately 90% of the remaining sagebrush are decadent and 70% of the sagebrush population were classified as dying in 2004. Average precipitation has been below normal average since 1999 (59% in 2002 and 69% in 2003) and spring precipitation has been even lower (9% in 2002 and 51% in 2003). This would be considered a marginal site for Wyoming big sagebrush because of the co-dominance of shadscale, indicating precipitation is normally significantly less than 10 inches per year. With the extended drought, this would be much less than what is normally received.

Shadscale is co-dominant with sagebrush. This spiny plant shows light hedging with good vigor, but it also has steadily decreased in density since 1994. The highly palatable bud sagebrush was also fairly common in 1988 and 1994 but was not encountered in 1999 and 2004. Use is difficult to determine on these small prostrate shrubs and most were classified as lightly hedged. Low rabbitbrush was very common and has continually declined since 1988 estimates of 9,466 plants/acre, 4,540 in 1994, 4,080 in 1999, and 960 by 2004. These shrubs are small and generally not utilized as forage. Like sagebrush, many of the young counted in 1988 did not survive to maturity (drought and high soil temperatures). Other shrubs encountered on the site include a small number of winterfat, broom snakeweed, greasewood, and spiny horsebrush.

The herbaceous understory is typical for a mixed salt desert shrub community. All grasses combined had a cover value of only 5% in 1994, 7% in 1999, and 3% in 2004. Nested frequency has not changed significantly, but plants are smaller due to drought. Forbs are rare and produced only about 1% cover in 1994 and 1999, but increased slightly to 4% in 2004. However, more than one-half of this cover was contributed by annual forbs. Mostly by one species, annual stickseed. Grasses include bottlebrush squirreltail, Indian

ricegrass, needle-and-thread, and blue grama. Blue grama distribution is patchy, but where it occurs it dominates the surface as large mats. It provided 42% of the grass cover in 1994, 45% in 1999, and less than 1% in 2004. This species is severely effected by the lack of summer precipitaton. Indian ricegrass is also common and produced 47% of the grass cover in 1999 and 74% in 2004, although the actual percent cover decreased. The only common forbs are annuals, which include annual stickseed and wooly plantain.

1994 TREND ASSESSMENT

Ground cover characteristics have improved somewhat since 1988. Percent bare ground has declined from 67% to 57%. This is still a high amount of bare soil. With the lack of herbaceous vegetation, erosion is still an ongoing process. The browse trend is stable for the time being with stable populations of mature shrubs. Many young shrubs died off since the 1988 reading and few seedlings were encountered in 1994. This is likely due to the drought conditions of the past several years. Recruitment of desirable shrubs have declined on the site, but a return to normal precipitation patterns should reverse this trend. The herbaceous understory is lacking on the site, although sum of nested frequencies for perennial grasses and forbs have increased slightly indicating a slightly upward trend. The Desirable Components Index (see methods) rated this site as fair with a score of 39 due to moderate shrub cover, a few young shrubs, and moderate grass cover.

TREND ASSESSMENT

soil - up slightly (4)

browse - stable (3)

herbaceous understory - up slightly (4)

winter range condition (DC Index) - 39 (fair) Wyoming big sagebrush type

1999 TREND ASSESSMENT

Trend for soil is stable even with the slight improvement in relative percent bare soil has decreased from 57% to 53% and an increase in litter and cryptogamic relative cover. These minor changes do not warrant a change in trend. Erosion is still a major problem. Trend for browse is down slightly for the key species, Wyoming big sagebrush. Density has remained stable, but recruitment is down, utilization is mostly heavy, and percent decadence has increased from 25% to 50%. There are currently more decadent/dying sagebrush than young to replace them, indicating a most likely population decline in the future. Trend for the herbaceous understory is stable with similar sum of nested frequency values for grasses and forbs compared to 1994. The Desirable Components Index rated this site as fair with a score of 36 due to large increase in decadence, increase in young shrubs, and a increase in grass cover.

TREND ASSESSMENT

soil - stable (3)

browse - down slightly (2)

herbaceous understory - stable (3)

winter range condition (DC Index) - 36 (fair) Wyoming big sagebrush type

2004 TREND ASSESSMENT

Trend for soil is stable, even with the slight increase in relative percent bare soil. This change is not enough to show a downward change in trend. It continues to be in very poor condition and erosion is still a major problem. Relative percent cover for bare ground increased from 53 % in 1999 to 59% in 2004. Vegetation cover continues to decline and the majority of the cover is now shrub cover, which is not as effective at stabilizing the soil as herbaceous cover. Trend for key browse is down. Density of Wyoming big sagebrush has decreased to only 400 plants/acre and no recruitment was shown in 2004. The majority of the population is decadent and dying and most likely will no longer exist on this marginal site in the future. Trend for

herbaceous understory stable. The slight decrease in perennial grass nested frequency, coupled with the increase in perennial forb nested frequency adjusts the trend to basically stable, but still very poor. Forbs overall, doubled in nested frequency, but the increase was due mostly to small annuals such as annual stickseed. The Desirable Components Index rated this site as fair with a score of 29 due to decrease in shrub cover, few young shrubs, and a decrease in grass cover, but an increase in forb cover.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - stable (3)

winter range condition (DC Index) - 29 (fair) Wyoming big sagebrush type

HERBACEOUS TRENDS --

Management unit 16C, Study no: 32

Type	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
G	Agropyron cristatum	-	-	3	1	-	.03	.03
G	Agropyron smithii	-	-	2	-	-	.15	-
G	Agropyron spicatum inerme	-	1	-	-	.15	-	-
G	Bouteloua gracilis	_a 2	_{ab} 36	_b 55	_b 31	2.23	3.11	.28
G	Bromus tectorum (a)	-	_a -	_b 10	_a -	-	.02	-
G	Oryzopsis hymenoides	_a 64	_b 112	_{ab} 113	_b 113	2.57	3.27	1.92
G	Sitanion hystrix	_b 94	_a 51	_a 33	_a 30	.39	.27	.15
G	Sporobolus cryptandrus	_{ab} 5	_a -	_b 13	_b 20	-	.10	.21
Total for Annual Grasses		0	0	10	0	0	0.02	0
Total for Perennial Grasses		165	200	219	195	5.34	6.95	2.60
Total for Grasses		165	200	229	195	5.34	6.98	2.60
F	Arabis spp.	1	-	-	-	-	-	-
F	Astragalus spp.	23	32	14	36	.12	.04	.17
F	Calochortus nuttallii	-	-	4	5	-	.01	.01
F	Castilleja spp.	-	2	-	-	.00	-	-
F	Collinsia parviflora (a)	-	-	-	3	-	-	.00
F	Descurainia pinnata (a)	-	1	7	2	.00	.01	.01
F	Draba spp. (a)	-	6	-	-	.01	-	-
F	Eriogonum spp.	-	2	-	-	.00	-	-
F	Erigeron pumilus	_{ab} 7	_{ab} 5	_b 10	_a -	.01	.02	-
F	Lappula occidentalis (a)	-	_a 43	_a 18	_b 190	.07	.03	1.77
F	Malcolmia africana	-	-	-	1	-	-	.01
F	Machaeranthera canescens	_{ab} 11	_b 19	_a -	_a 1	.11	-	.03
F	Oenothera spp.	-	-	-	4	-	-	.16
F	Plantago patagonica (a)	-	_a 104	_b 191	_a 97	.45	1.08	.46
F	Sphaeralcea coccinea	_a 5	_a 11	_a 8	_b 49	.05	.03	.68
F	Townsendia incana	_b 54	_b 34	_a 8	_b 44	.25	.07	.87

T y p e	Species	Nested Frequency				Average Cover %		
		'88	'94	'99	'04	'94	'99	'04
F	Trifolium spp.	-	-	-	3	-	-	.00
F	Unknown forb-annual (a)	-	2	-	-	.00	-	-
Total for Annual Forbs		0	156	216	292	0.54	1.13	2.25
Total for Perennial Forbs		101	105	44	143	0.56	0.18	1.95
Total for Forbs		101	261	260	435	1.11	1.31	4.21

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 16C, Study no: 32

T y p e	Species	Strip Frequency			Average Cover %		
		'94	'99	'04	'94	'99	'04
B	Artemisia spinescens	31	0	0	.51	-	-
B	Artemisia tridentata wyomingensis	69	72	17	3.58	4.68	.66
B	Atriplex confertifolia	81	69	70	5.55	3.45	6.32
B	Ceratoides lanata	6	4	5	.06	.00	.21
B	Chrysothamnus nauseosus	-	-	-	-	-	.00
B	Gutierrezia sarothrae	64	70	25	-	-	-
B	Chrysothamnus viscidiflorus	1	0	0	2.06	1.99	.46
B	Opuntia spp.	17	21	14	.40	.36	.07
B	Sarcobatus vermiculatus	12	14	16	1.61	1.35	2.06
B	Sclerocactus	2	8	0	.03	.15	-
B	Tetradymia spinosa	13	14	0	.19	.36	-
Total for Browse		296	272	147	14.03	12.38	9.80

CANOPY COVER, LINE INTERCEPT --

Management unit 16C, Study no: 32

Species	Percent Cover
	'04
Artemisia tridentata wyomingensis	.95
Atriplex confertifolia	7.31
Ceratoides lanata	.08
Chrysothamnus viscidiflorus	.91
Opuntia spp.	.23
Sarcobatus vermiculatus	3.96

BASIC COVER --

Management unit 16C, Study no: 32

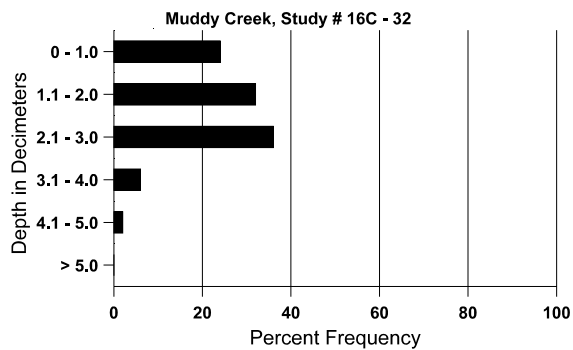
Cover Type	Average Cover %			
	'88	'94	'99	'04
Vegetation	2.50	22.87	19.34	16.51
Rock	0	.91	.50	.52
Pavement	.75	.21	.46	.33
Litter	20.00	14.56	17.69	22.10
Cryptogams	10.00	3.65	7.27	5.55
Bare Ground	66.75	56.71	52.81	64.86

SOIL ANALYSIS DATA --

Management unit 16C, Study no: 32, Study Name: Muddy Creek

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
10.6	72.2 (9.4)	7.6	56.0	23.4	20.6	0.7	5.9	89.6	3.4

Stoniness Index



PELLET GROUP DATA --

Management unit 16C, Study no: 32

Type	Quadrat Frequency		
	'94	'99	'04
Rabbit	10	12	5
Elk	35	55	44
Deer	33	9	3
Cattle	3	-	1

Days use per acre (ha)	
'99	'04
-	-
70 (173)	73 (180)
12 (30)	19 (46)
1 (2)	6 (14)

BROWSE CHARACTERISTICS --

Management unit 16C, Study no: 32

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Artemisia spinescens</i>												
88	1399	66	800	533	66	-	0	0	5	-	0	3/5
94	1560	-	20	1100	440	20	46	0	28	8	10	4/9
99	0	-	-	-	-	-	0	0	0	-	0	-/-
04	0	-	-	-	-	-	0	0	0	-	0	-/-
<i>Artemisia tridentata wyomingensis</i>												
88	7532	666	3933	2533	1066	-	25	11	14	-	0	15/19
94	3120	-	220	2120	780	1140	32	3	25	8	10	13/17
99	3200	20	180	1420	1600	1240	33	48	50	12	12	13/19
04	400	-	-	40	360	1480	15	75	90	70	70	15/25
<i>Atriplex confertifolia</i>												
88	7866	1000	3600	2866	1400	-	11	6	18	-	0	9/10
94	5580	-	280	4820	480	40	.35	0	9	2	2	8/15
99	4340	20	720	2760	860	220	10	.92	20	5	5	7/13
04	3480	360	80	2860	540	1440	3	0	16	9	12	10/20
<i>Ceratoides lanata</i>												
88	600	-	200	400	-	-	11	33	0	-	0	6/6
94	140	-	-	120	20	-	43	0	14	-	0	6/6
99	120	20	-	20	100	-	0	100	83	-	0	4/5
04	120	120	-	120	-	-	33	17	0	-	33	9/11
<i>Chrysothamnus viscidiflorus</i>												
88	9466	66	4800	4666	-	-	4	.70	0	-	.70	7/9
94	4540	-	280	4220	40	-	0	0	1	-	.88	9/11
99	4080	40	460	3440	180	60	15	.98	4	.49	10	7/12
04	960	20	40	660	260	520	0	0	27	23	29	10/16
<i>Gutierrezia sarothrae</i>												
88	0	-	-	-	-	-	0	0	-	-	0	-/-
94	20	-	20	-	-	-	0	0	-	-	0	-/-
99	0	-	-	-	-	-	0	0	-	-	0	-/-
04	0	-	-	-	-	-	0	0	-	-	0	-/-
<i>Opuntia spp.</i>												
88	133	-	-	133	-	-	0	0	0	-	0	6/16
94	460	-	-	460	-	-	0	0	0	-	0	4/16
99	760	120	140	580	40	100	0	0	5	-	5	5/13
04	420	-	20	400	-	20	0	0	0	-	0	4/12

		Age class distribution (plants per acre)					Utilization					
Y e a r	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
<i>Sarcobatus vermiculatus</i>												
88	399	-	333	66	-	-	0	17	0	-	0	19/31
94	440	-	20	400	20	-	0	0	5	-	0	17/27
99	640	-	80	460	100	40	0	0	16	13	13	16/30
04	580	-	40	460	80	200	4	0	14	7	7	18/37
<i>Sclerocactus</i>												
88	666	-	-	666	-	-	0	0	-	-	0	3/0
94	120	-	-	120	-	20	0	0	-	-	0	3/4
99	220	-	-	220	-	-	0	0	-	-	0	3/4
04	0	-	-	-	-	80	0	0	-	-	0	-/-
<i>Tetradymia spinosa</i>												
88	66	-	-	66	-	-	0	0	0	-	0	12/16
94	440	-	20	380	40	-	5	5	9	5	5	11/18
99	600	-	80	480	40	280	0	3	7	-	97	4/11
04	0	-	-	-	-	-	0	0	0	-	0	-/-